Manufacturing Tests of the Analog Receiver (ARX) Boards

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1 Introduction

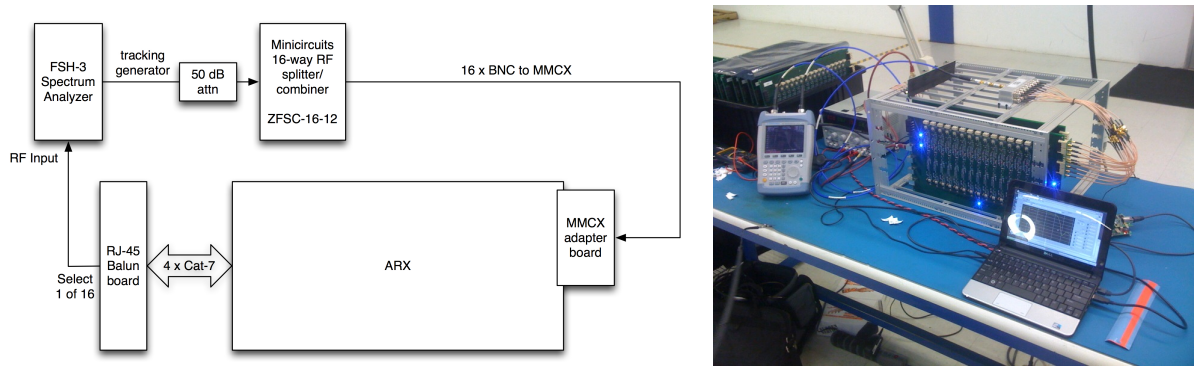
A total of 35 ARX boards (aka, Gen2) were ordered from Delta Group Electronics (Albuquerque, NM). Testing was conducted at Delta, prior to acceptance of the 35 board lot. This document package summarizes the tests perfomed, and includes the test result data. Data shown includes both Gen1 (S/N: 0101 to 0108) and the Gen2 (S/N: 0109 to 0143) boards.

2 Test Description

A Rhode & Schwarz, FSH-3 spectrum analyzer with tracking generator was used to sweep every ARX channel of every board to obtain S21 (magnitude) of each of the 3 filters in full-gain mode and to measured the mean attenuation of each attenuator bit over a 1 MHz bandwidth.

A RabbitCore RCM4200 Dev Kit was used to interface the SPI bus control of the ARX boards. This was directly connected to the control laptop. The FSH-3 was also connected to the laptop for LabVIEW automation.

Figure 1 shows the hardware connections made to faciliate rapid testing. The tracking generator signal is attenuated by 50 dB, split 16-ways, and distributed to all 16 channels of the ARX board under test. The output of an RJ-45 to SMA balun board was connected to the spectrum analyzer for each channel under test.



(a) Block Diagram

(b) In-use at Delta Group Electronics

Figure 1: Hardware Test Setup

3 Data Collected

The Dataset can be found here, or under the Engineering Memo ARX0026.

Each ARX board's data is organized in a folder by Serial Number. A summary file provides the Pass/Fail information for each attenuator, along with it's measured attenuation value. The filter magnitude data is also written to spreadsheet files, one file for each channel. The data is orgainized in columns as follows:

Full-BW S21 (dB)	Full-BW Freq (Hz)	Reduced-BW S21 (dB)	Reduced-BW Freq (Hz)	Split-BW S21 (dB)	Split-BW Freq (Hz)

All filters were measured in the maximum gain configuration. The Split-Bandwidth filter was measured with maximum attenuation on the low frequency potion of the passband. The measurement setup was not well calibrated for loss, so the ARX gain are actually about 3 dB higher than shown.

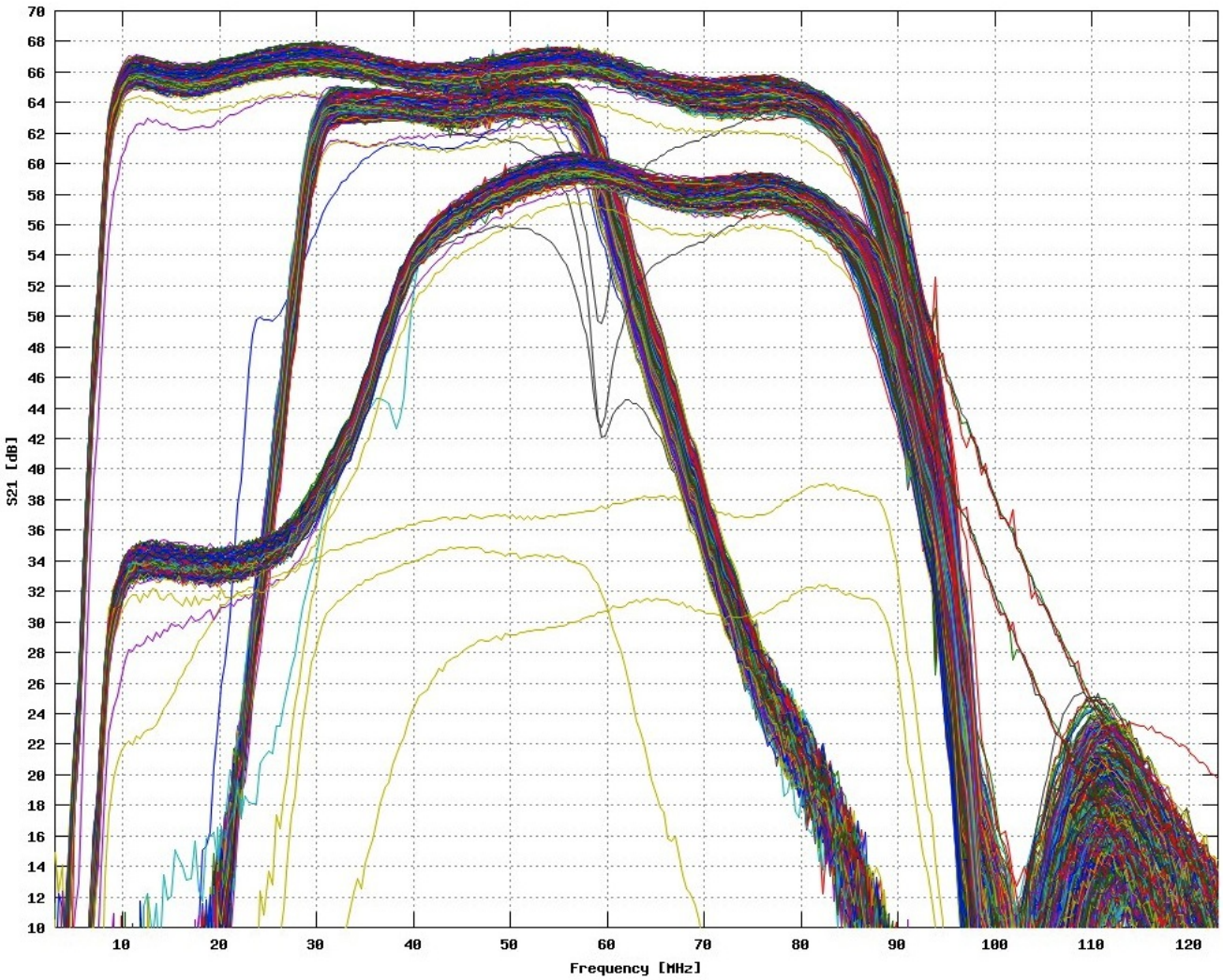


Figure 2: Magnitude response of all filters. No attempt was made to remove the obviously bad ARX channels. These have been flagged as unusable.

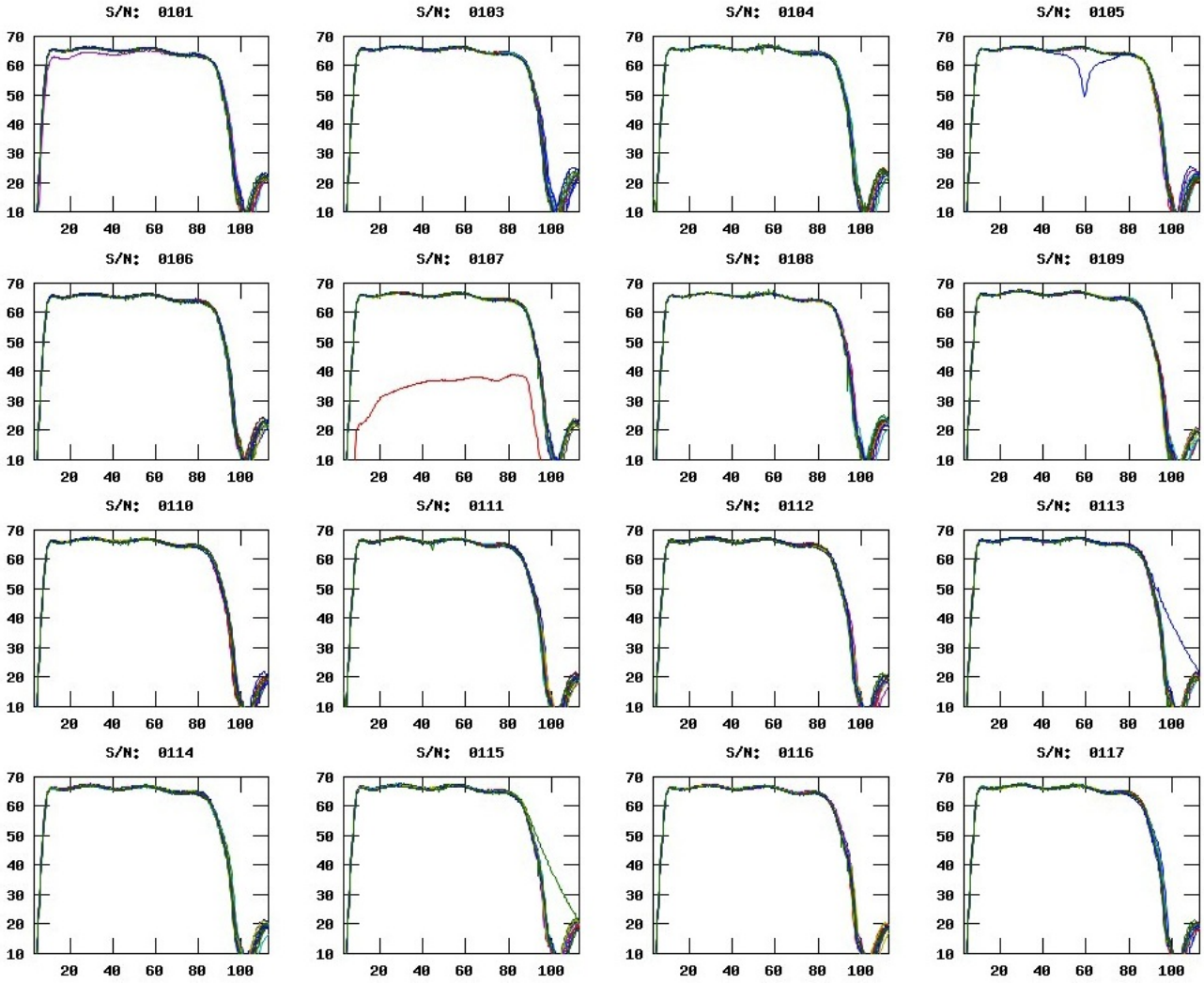


Figure 3: Magnitude response of the Full-Bandwidth filter configuration, split up into individual ARX boards (16 channels shown per board). Y-axis is Gain in dB; X-axis is Frequency in MHz. Page 1

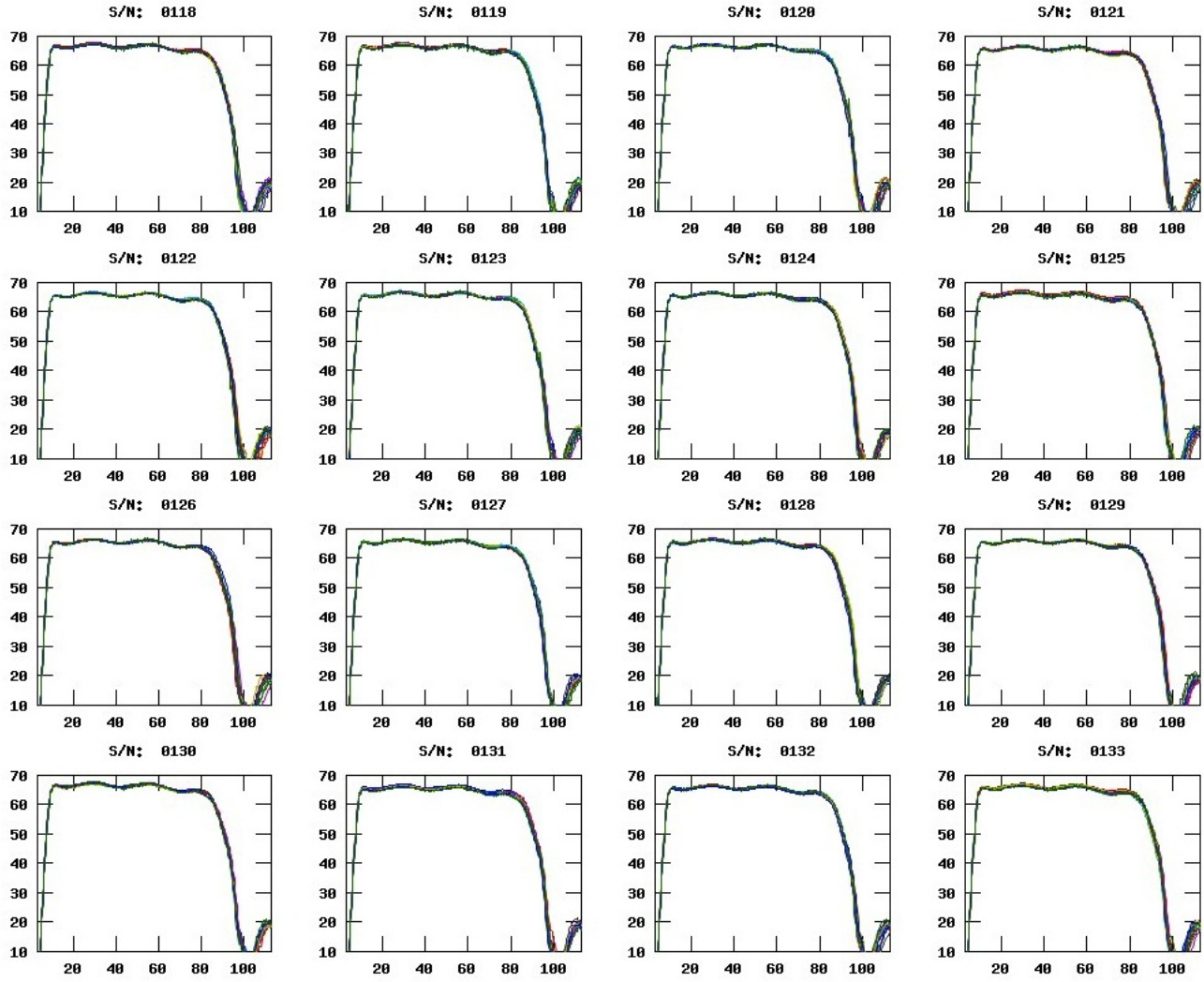


Figure 4: Magnitude response of the Full-Bandwidth filter configuration, split up into individual ARX boards (16 channels shown per board). Y-axis is Gain in dB; X-axis is Frequency in MHz. Page 2

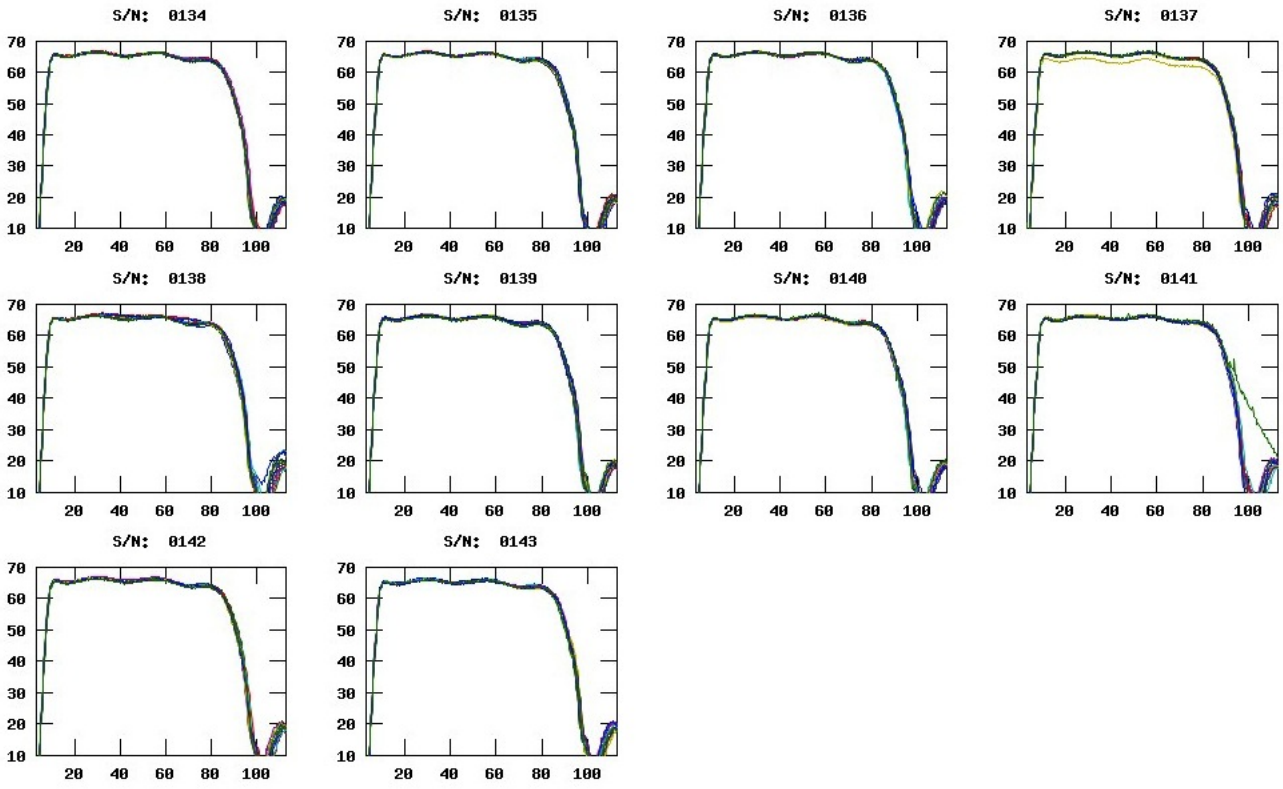


Figure 5: Magnitude response of the Full-Bandwidth filter configuration, split up into individual ARX boards (16 channels shown per board). Y-axis is Gain in dB; X-axis is Frequency in MHz. Page 3

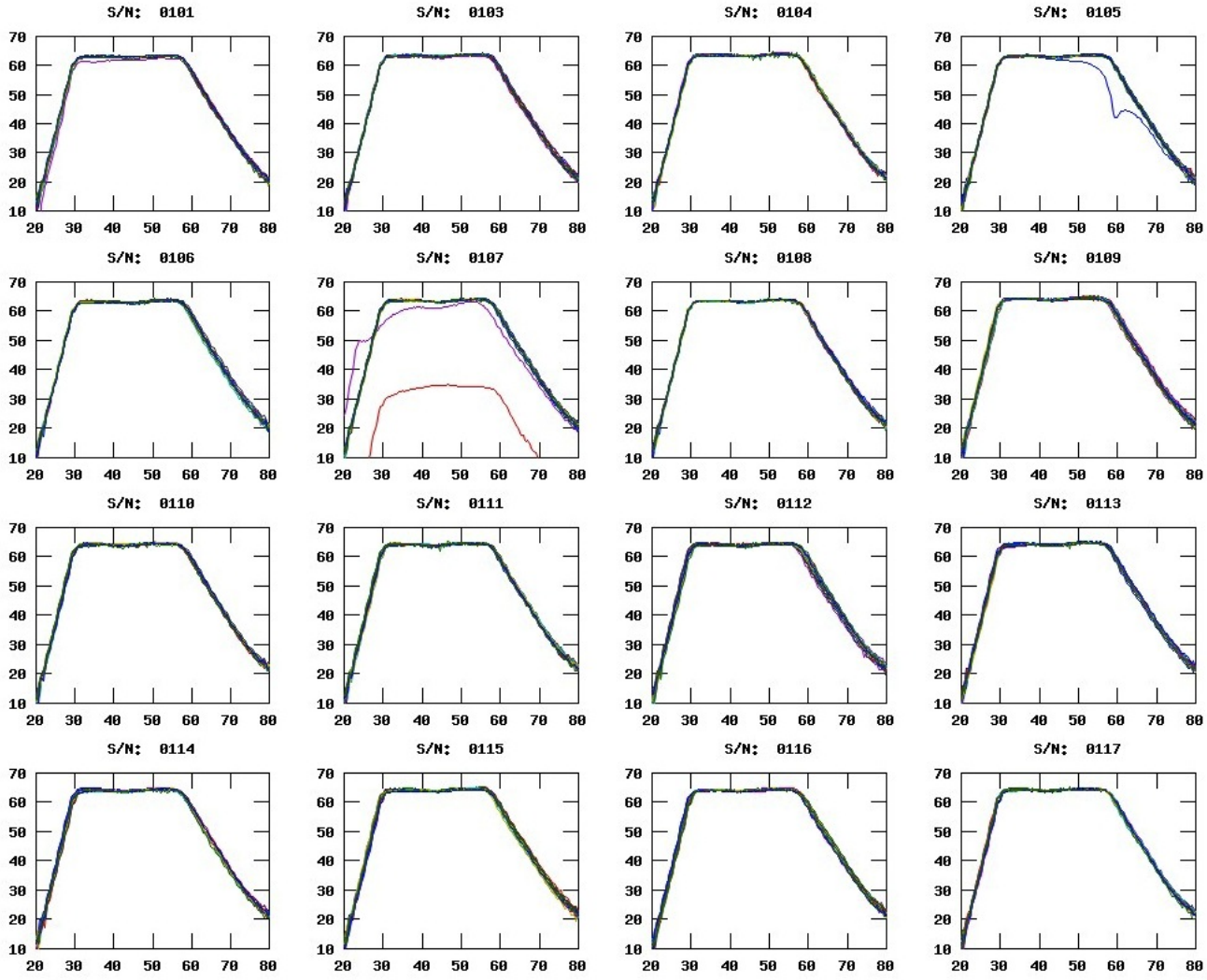


Figure 6: Magnitude response of the Reduced-Bandwidth filter configuration, split up into individual ARX boards (16 channels shown per board). Y-axis is Gain in dB; X-axis is Frequency in MHz. Page 1

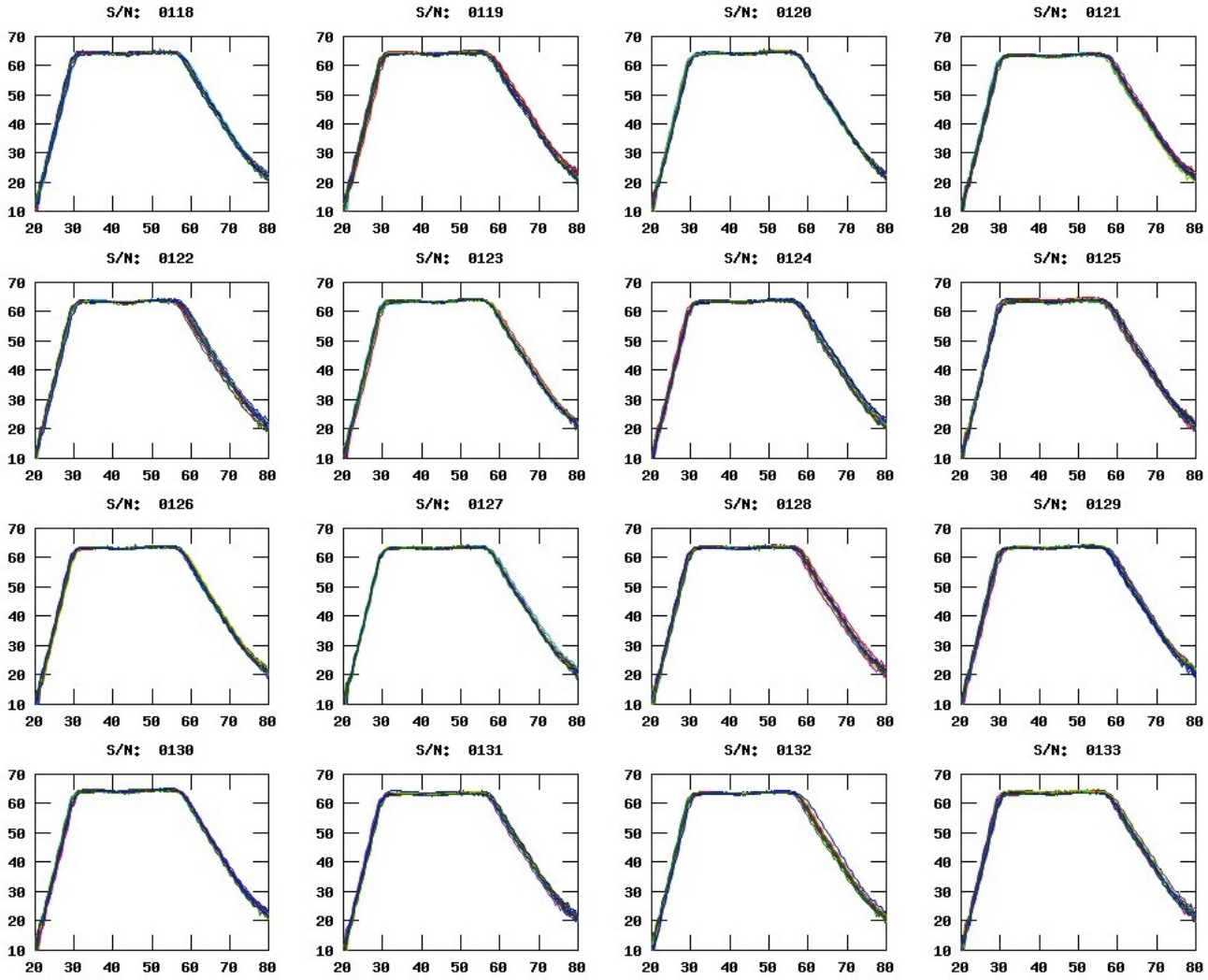


Figure 7: Magnitude response of the Reduced-Bandwidth filter configuration, split up into individual ARX boards (16 channels shown per board). Y-axis is Gain in dB; X-axis is Frequency in MHz. Page 2

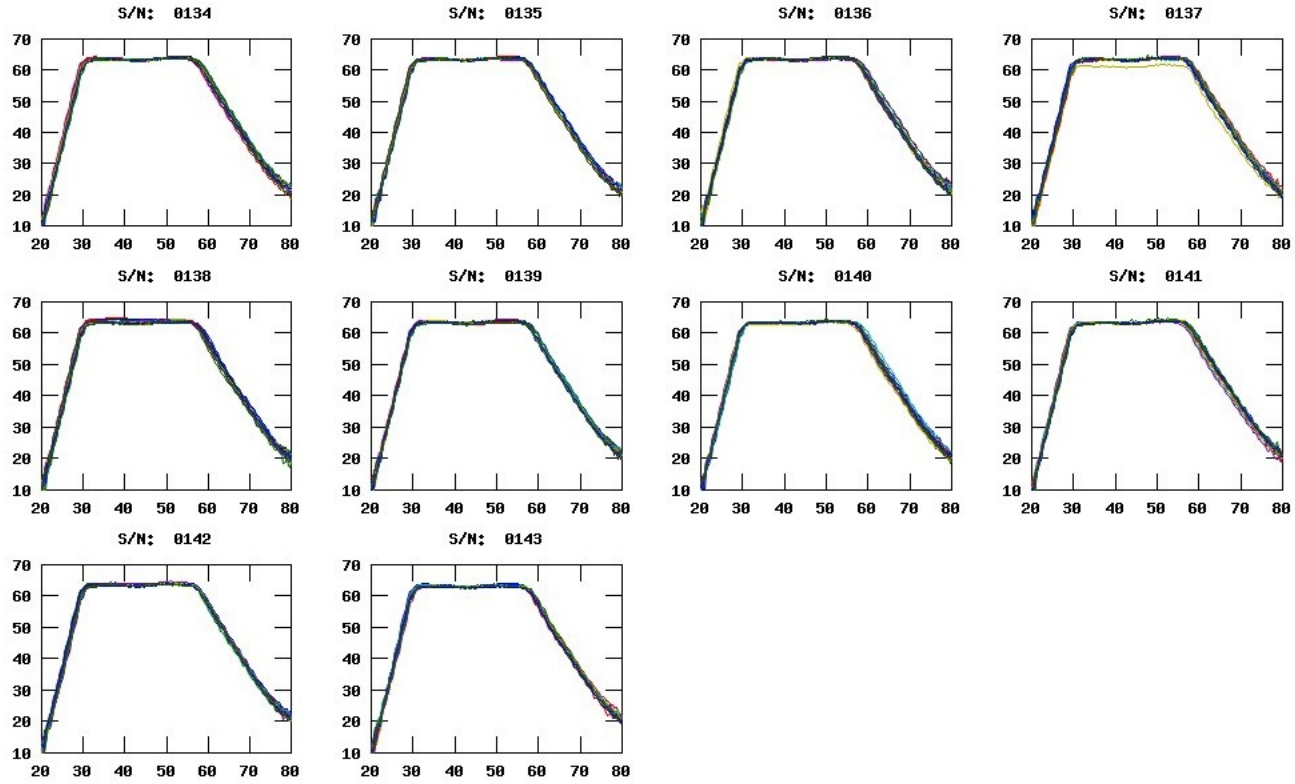


Figure 8: Magnitude response of the Reduced-Bandwidth filter configuration, split up into individual ARX boards (16 channels shown per board). Y-axis is Gain in dB; X-axis is Frequency in MHz. Page 3

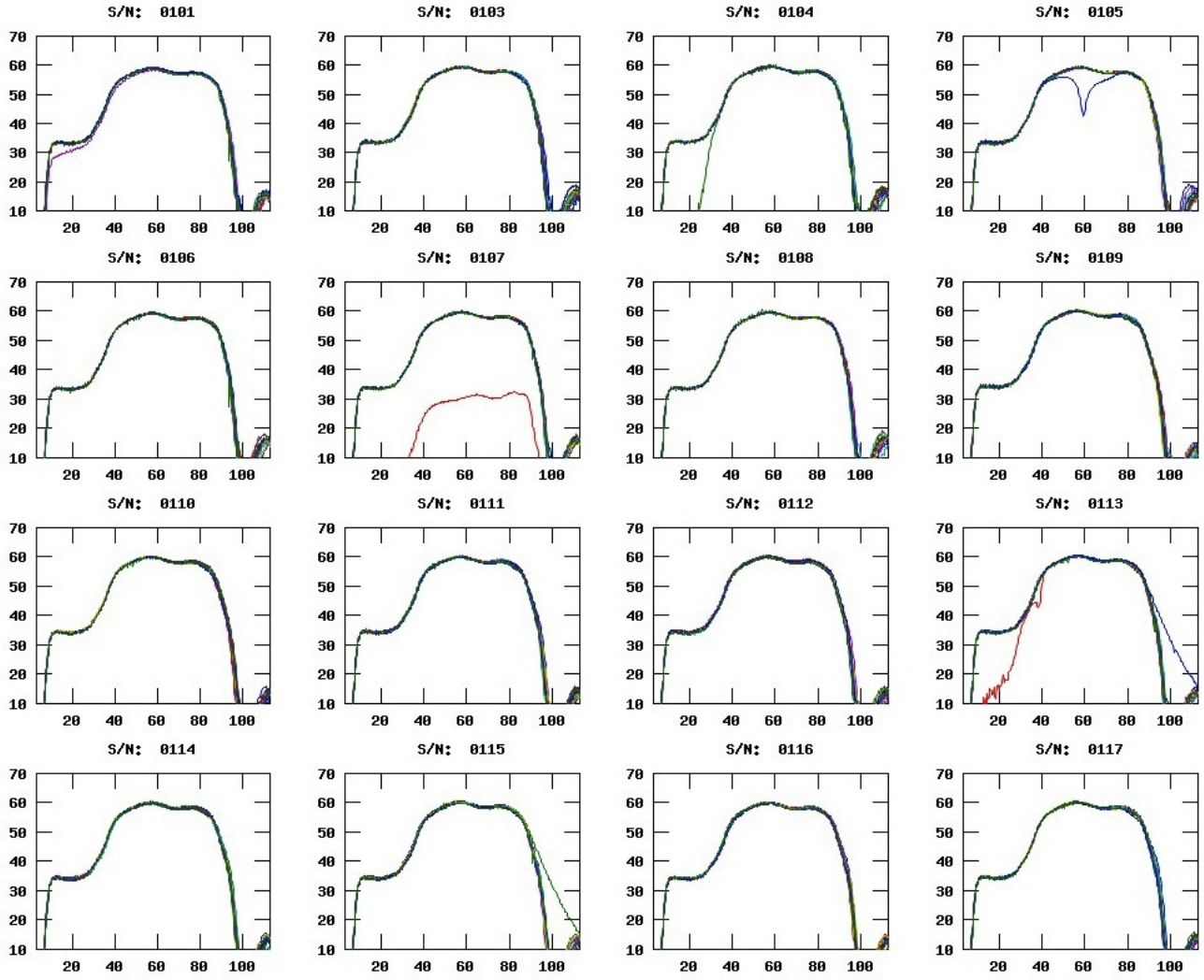


Figure 9: Magnitude response of the Split-Bandwidth filter configuration, split up into individual ARX boards (16 channels shown per board). Y-axis is Gain in dB; X-axis is Frequency in MHz. Page 1

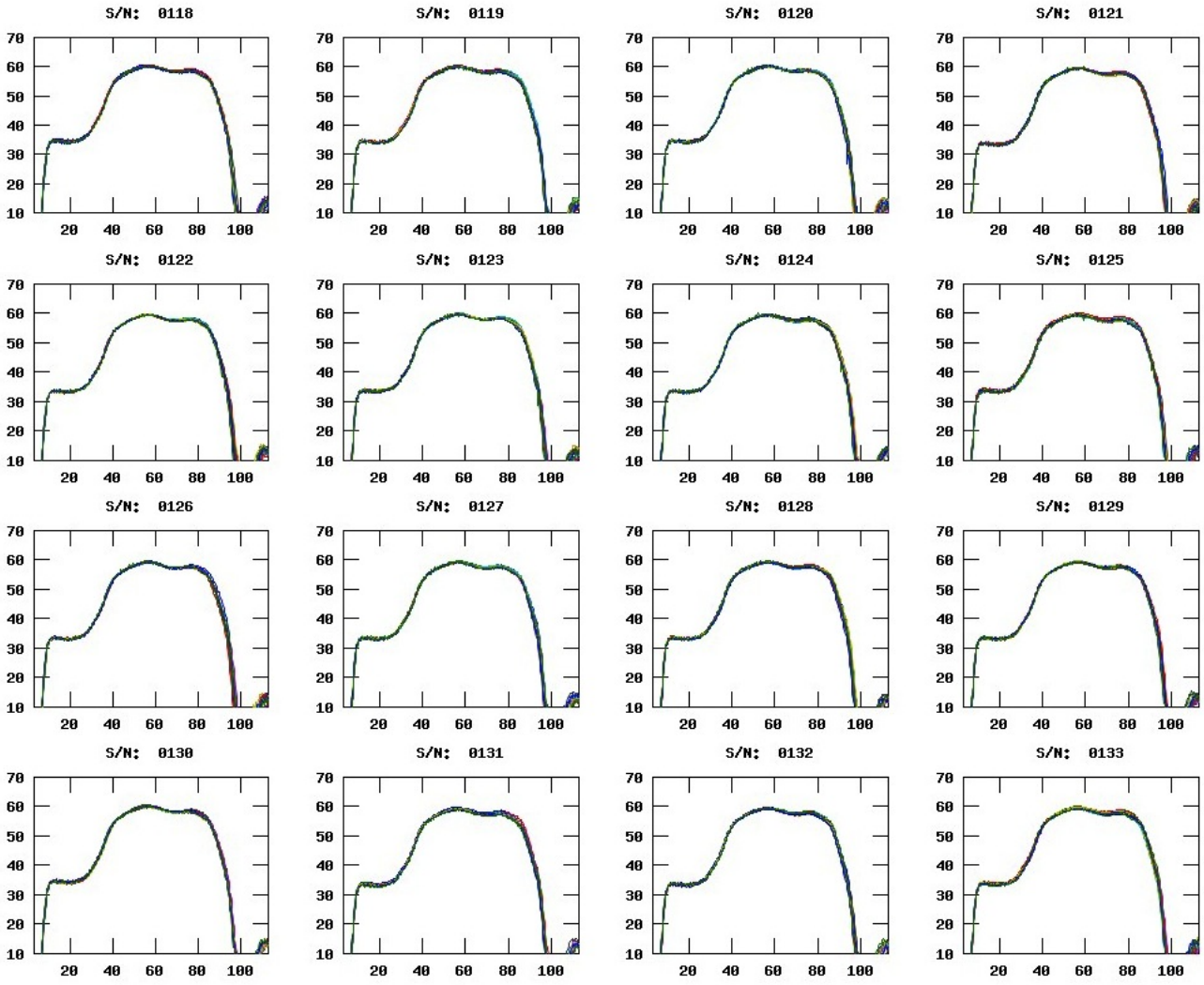


Figure 10: Magnitude response of the Split-Bandwidth filter configuration, split up into individual ARX boards (16 channels shown per board). Y-axis is Gain in dB; X-axis is Frequency in MHz. Page 2

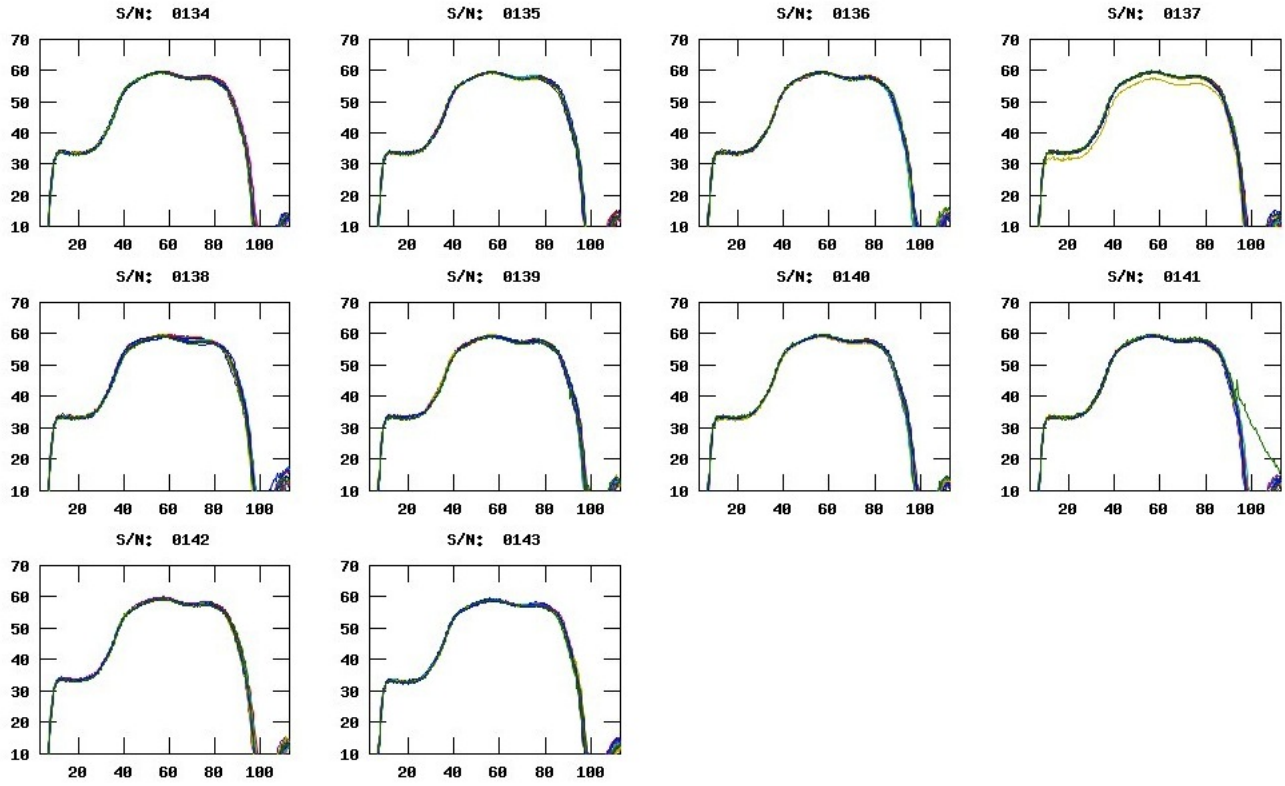


Figure 11: Magnitude response of the Split-Bandwidth filter configuration, split up into individual ARX boards (16 channels shown per board). Y-axis is Gain in dB; X-axis is Frequency in MHz. Page 3